

UPDATED September 13th 2004

## Sound Sculpture user guide (V2.4)

### Acknowledgments and Feedback

One reason that this new Sound Sculpture is so good is that there are many who have found the Sound Sculpture useful over the past few years who have taken the time to bring to my attention certain necessary changes, suggestions and recommendations, and this new version benefits from there helpful criticism.

Please let me have your feedback so that I can improve the documentation... your thoughts are appreciated...

## Sound Sculpture

Sound Sculpture is an electronic musical instrument which provides access to music-making for those of us who are unable to play a conventional musical instrument such as saxophone, guitar, piano, drums etc.

In essence, Sound Sculpture replaces the usual piano-type keyboard of a synthesiser with special sensors which enable people with a wide range of mobility difficulties to make musical sounds as if they were actually playing on a conventional keyboard.

Sound Sculpture has a built in ultrasonic sensor with a range adjustable up to 10 metres or 30 feet.

Sound Sculpture also has a variable voltage input which provides access to other types of sensor. Switches, mats, air pressure sensors and other sensors specially designed to suit individual requirements can all be used with Sound Sculpture.



### Some Benefits and Advantages

#### Visual Feedback

Sound Sculpture provides visual feedback using a Laser light scanner to show visually the extent and location of the *active space* of the ultrasonic sensor. The Laser can be switched off if you want to keep the *active space* invisible.

This visual feedback provides a real improvement in ease-of-use and speeds up the dawning of awareness... the awareness that the sounds and music are made by your own movements.

### **Musicality - Rhythm Harmony and Form**

The ability to *synchronise* the Sound Sculpture with other instruments and musicians or recordings using a microphone. Or to *sequence* it using MIDI, gives Sound Sculpture powerful rhythmic potential.

With this rhythmic capability and its versatile harmonic tools, Sound Sculpture enables group performances with as much rhythmic and harmonic integrity as you choose. From totally in-time and in-tune, to completely chaotic, atonal and formless.

With Sound Sculpture you also have the ability to control pitch-bend, volume and other aspects of the synthesiser sound, using any of the sensors.

Sound Sculpture is a musical instrument of the highest calibre in its own right. You can follow complex jazz scores if you really want to, by sequencing through different harmonies with a midi-footswitch or sequencer.

### **Recording Your Own**

You can record your own music from a keyboard or sequencer directly into Sound Sculpture. And then replay it using the sensors. The recorded music can be a sequence of single notes, chords or a mixture of single notes and chords...

Each recorded sequence can contain over 190 recorded notes. You can record up to 39000 notes of your own music into Sound Sculpture.

### **Flexible, Ease to Use, Accessible**

Users have been very impressed by the flexibility and ease of use incorporated into the Sound Sculpture. This is the result of carefully incorporating the suggestions, ideas and requirements of the many individuals and organisations, clients and colleagues who have collaborated with Sound Sculpture's development and maturation, while maintaining a sense of balance between flexibility, ease of use and accessibility.

### **Sound Patches and Memory Cards**

A sound patch is a convenient way of handling all the settings and adjustments you make during a Sound Sculpture session, as well as any recorded material, so that you can build up a library of personalised set-ups. Sound Sculpture has 200 sound patches built in, each one can be modified, renamed and saved.

Also, patches can be saved or loaded from plug-in transferable memory cards. There are 100 patches per card.

### **Affordability**

Every effort has been made to make sure Sound Sculpture is as affordable and accessible as possible. I aim to make a living, not a killing. Modern electronics is cheap to produce except for the development and marketing costs. I have absorbed most of the development costs myself and have no need to recover these costs from the users. Marketing costs are kept to a minimum, word-of-mouth is free and honest. Sound Sculpture uses very recent technology, much less expensive and much more powerful than anything available a few years ago.

### **About the Originator**

Sound Sculpture has been developed by Jon Shaw over the past 6 years in collaboration with many organisations and health and music professionals. (Drake Music Project, New Era Housing Project, Immersive Media Spaces, Sheffield Social Services, Oldham Social services, New Mills Community arts... ), it has been incorporated in permanent installations, art exhibitions, it has been central to live public performances, and is used daily by day-care centres and individuals.

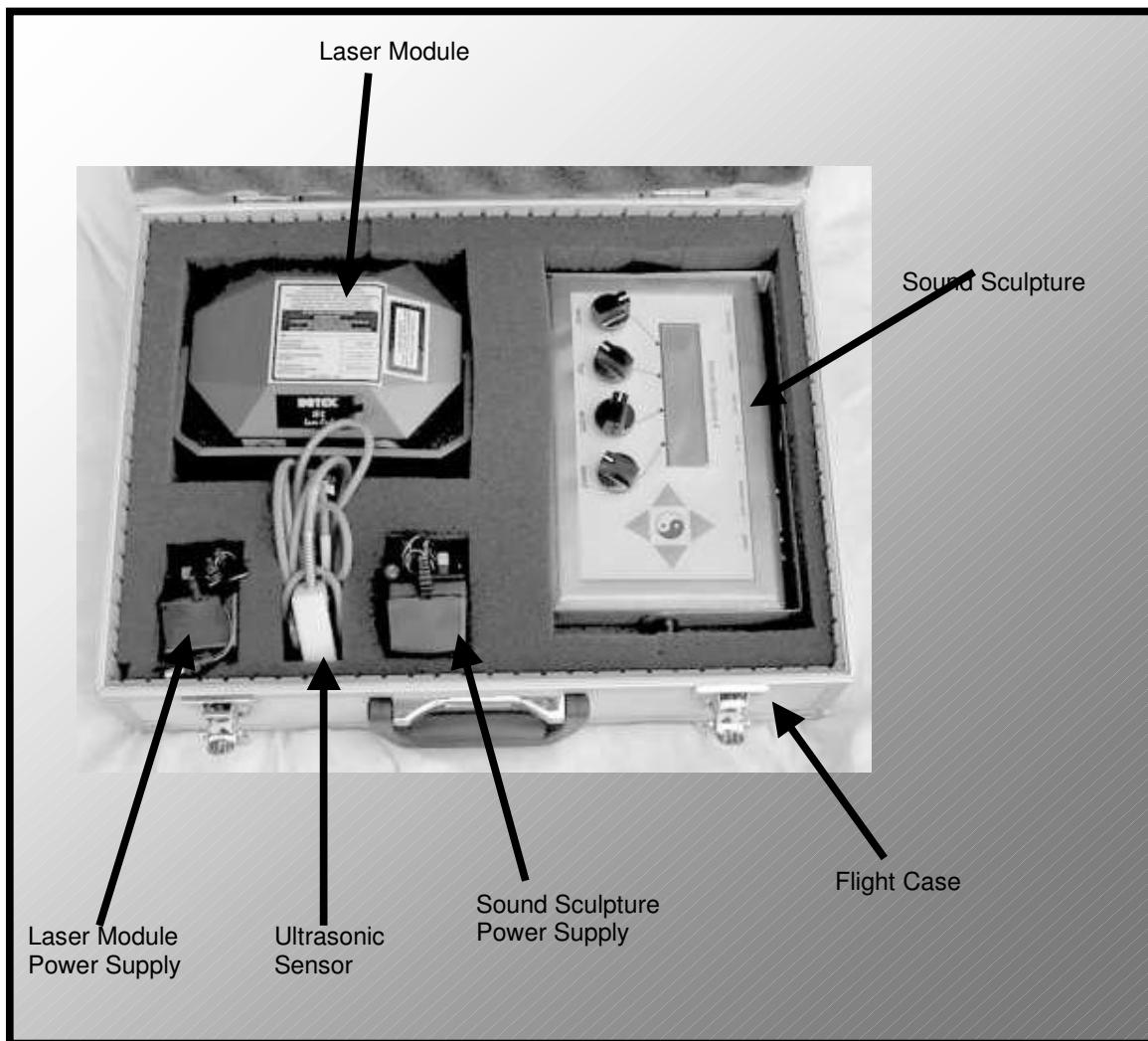
I work as a musician, technologist, trainee music therapist , teacher, and music workshop facilitator. I have experience working with various client groups including people with severe learning disabilities, trainee therapists, care workers, and musicians of diverse experience levels.

I have 15 years experience as a high flyer in the electronics and computer industry.

Last year I taught music therapy techniques to trainee therapists at Stockport College of Further Education.

I developed the Sound Sculpture because I identified the need for an affordable, flexible, easy-to-use, above all *accessible*, alternative to existing equipment.

My varied experiences in the fields of music therapy, as a musician and as an electronics engineer, and my close contact with colleagues and organisations working in relevant fields, have allowed me to develop Sound Sculpture with a high level of awareness of the needs of the user.

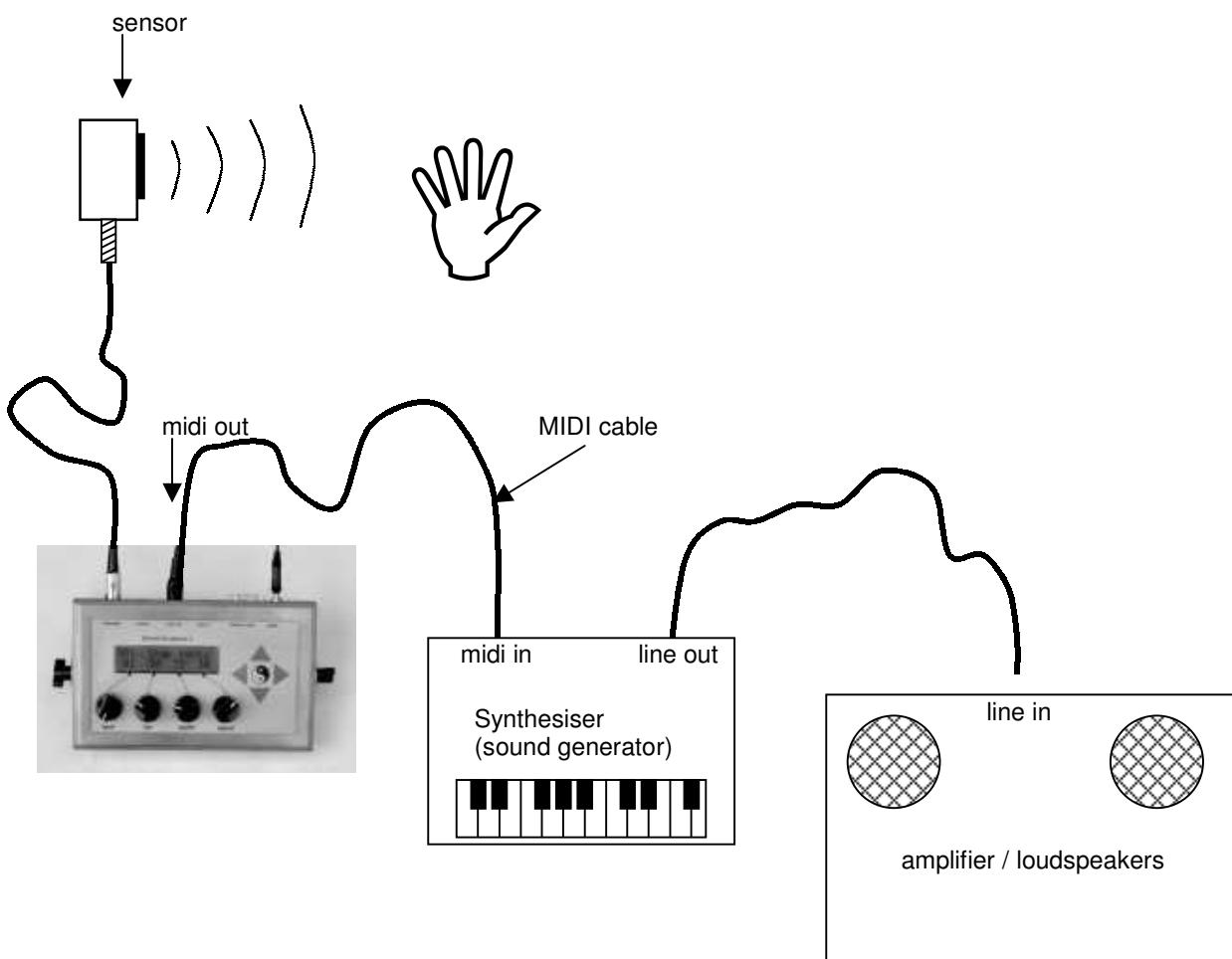


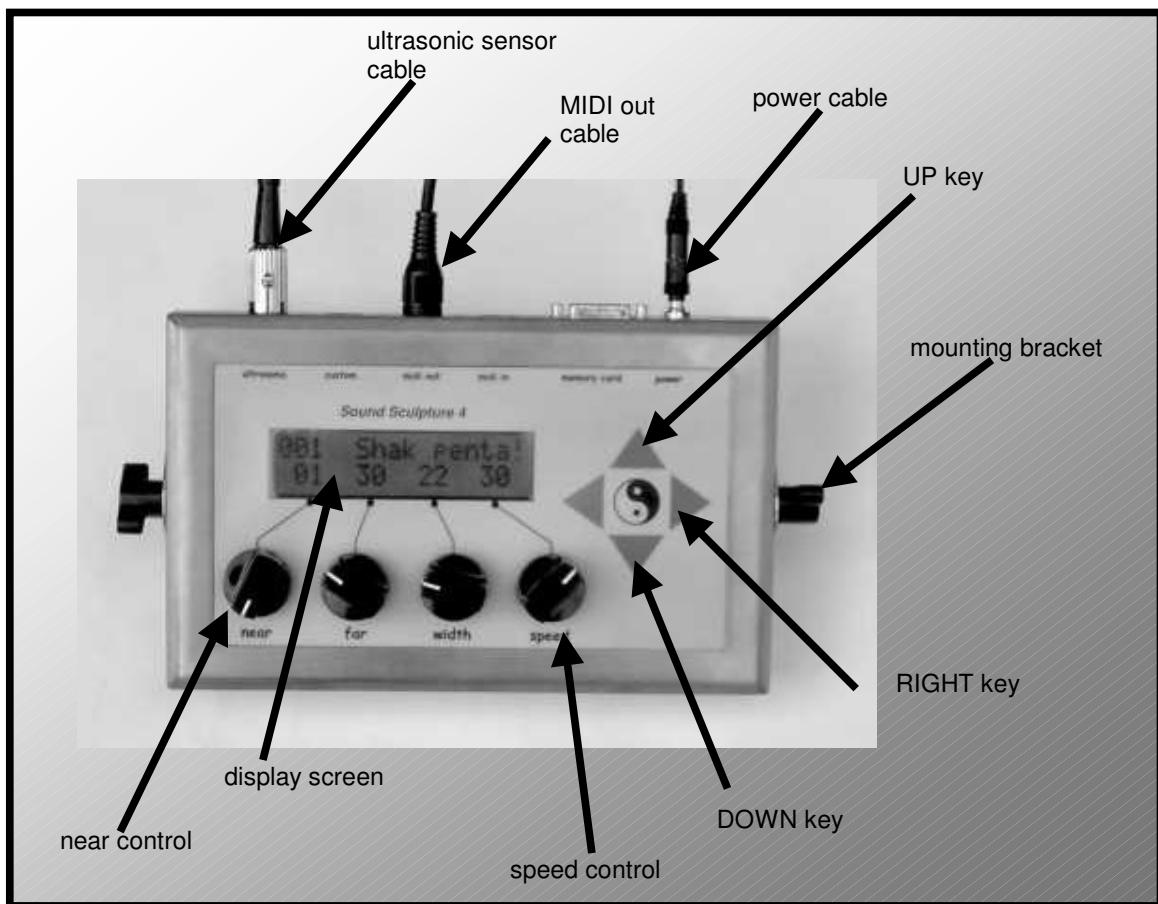
### Connecting up your Sound Sculpture

The Sound Sculpture is a MIDI (Musical Instrument Digital Interface) control unit. It doesn't generate any sound of its own. The sounds are generated by a MIDI compatible synthesiser which responds to messages sent to it by the Sound Sculpture. The synthesiser may have built in loudspeakers. If not you will need to connect the synthesiser to a sound system... a domestic Hi Fi, or whatever.

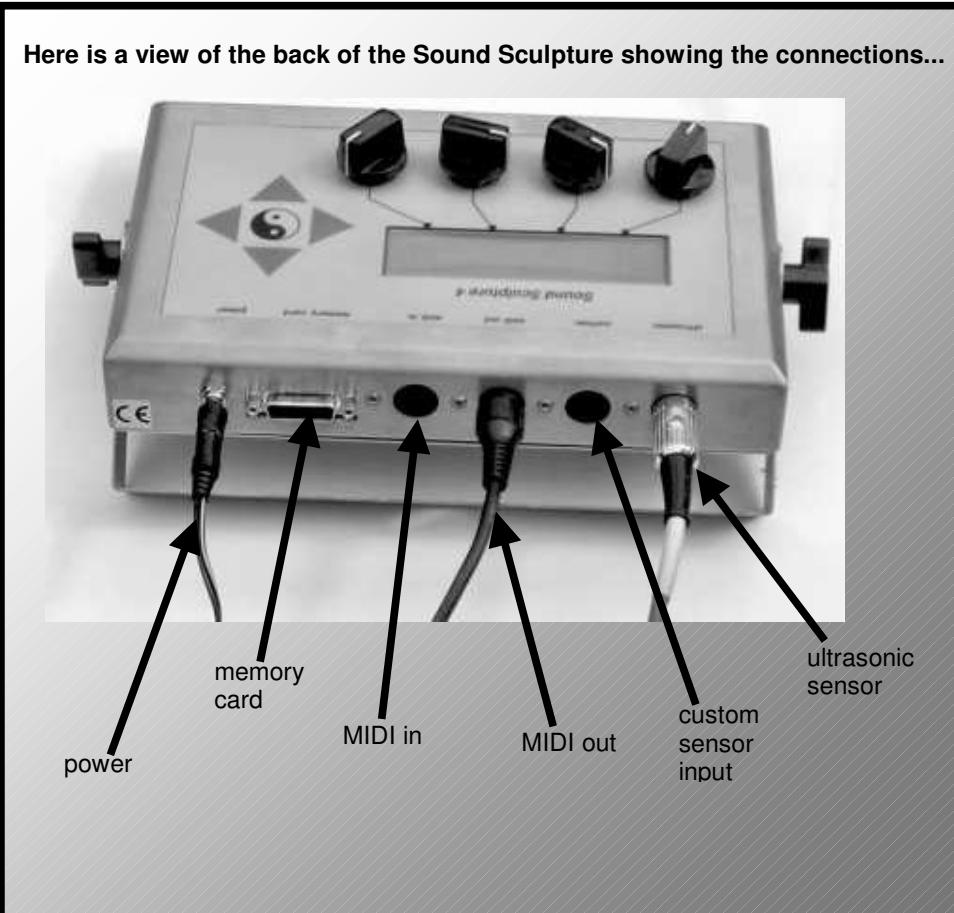
You can plug Sound Sculpture directly into most Personal Computers if there is a MIDI interface fitted (most modern computers have one fitted as standard, although often you will need an adapter cable (obtain this from your computer vendor).

Most PCs have a built in synthesiser (often called a ' Sound Card' ), and you can listen to the sounds using the computers' multimedia ' speaker system...





Here is a view of the back of the Sound Sculpture showing the connections...



## Getting started

Be aware that the laser is safe to use, but as with any flashing light it may induce epileptic fits or dizziness and it is unwise to look directly into the beam.

If you are in any doubt switch the laser off, and do not use it.

You can mount the sensor on any magnetic surface, or fit it to a mic. stand using the adapter.

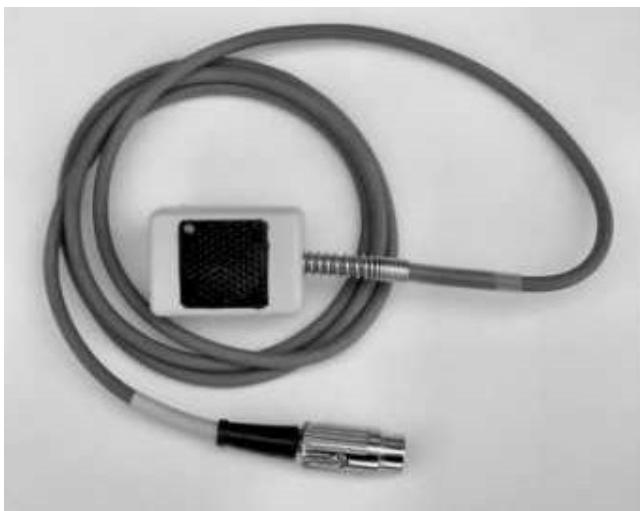
The Sound Sculpture itself can also be mounted on a mic. stand using the mounting bracket.

## Connecting up the Sound Sculpture

- fit the laser module to the gooseneck stand (or any microphone stand)



- Fit the sensor (blue cable) to the magnet on the front of the laser module

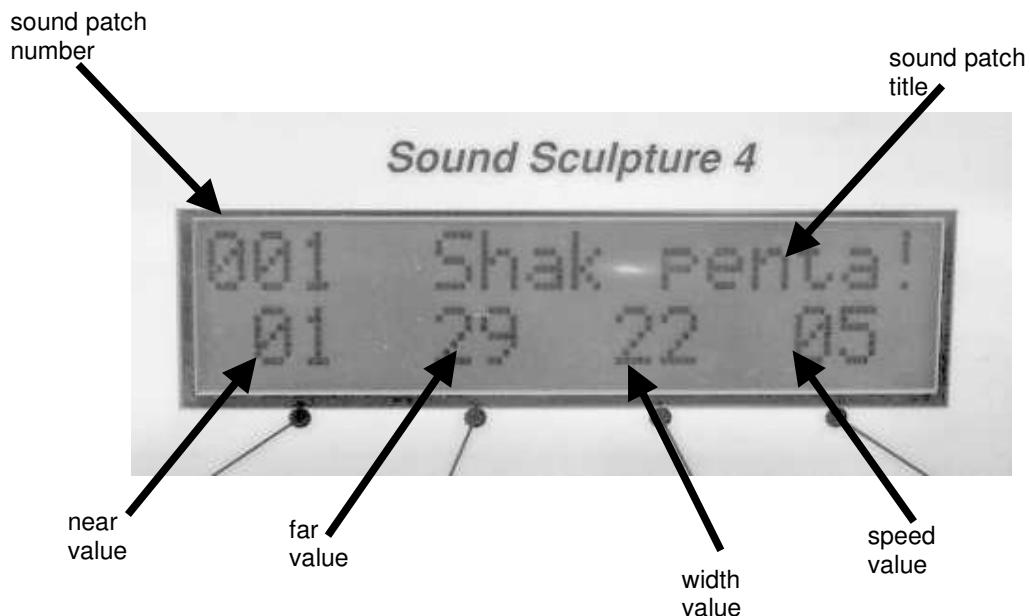


- Plug the sensor (blue cable) into the socket marked *ultrasonic*
- Plug the midi cable into the socket marked *midi out*
- Plug the other end of the midi cable into your synthesiser *midi in* socket
- Plug the small mains power adapter adapter into the power socket on the back of the laser module
- Plug the larger mains power adapter adapter into the socket marked *power* on the Sound Sculpture, and switch it on

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The Sound Sculpture screen will light up and a few seconds later the **home screen** will be visible...

Here' s the **home screen**... this is what you will see when you first switch on the Sound Sculpture.



The numbers on the bottom line indicate the value of the near, far, width and speed controls...  
Notice how the numbers change when you rotate the controls...

- Set the *near* control to 1 (fully anticlockwise)
- Set the *far* control to about 10
- Set the *width* control to about 30
- Set the *tempo* control to about 20

If you move your hand in front of the sensor you will see the blue light on the sensor flash, (also an asterisk flashes on the display screen to show that you are in the performance space), and you will be able to play the synthesiser by moving your hand.

If the blue light (and asterisk) flash continuously, then turn down the *far* control... this just means that there is some object ( a chair, wall, or whatever) within the selected range, i.e; you need to reduce the range to an clear and unobstructed space.



- **NOTE the sensor doesn't respond if you are too close... while playing try to keep at least 2 feet away from the sensor...** (this is deliberate so that you can mute all sounds by putting your hand near to the sensor... try this with a sustained sound like a flute or a voice pad... ). When you are in the near to the sensor an asterisk flashes next to the **near display**

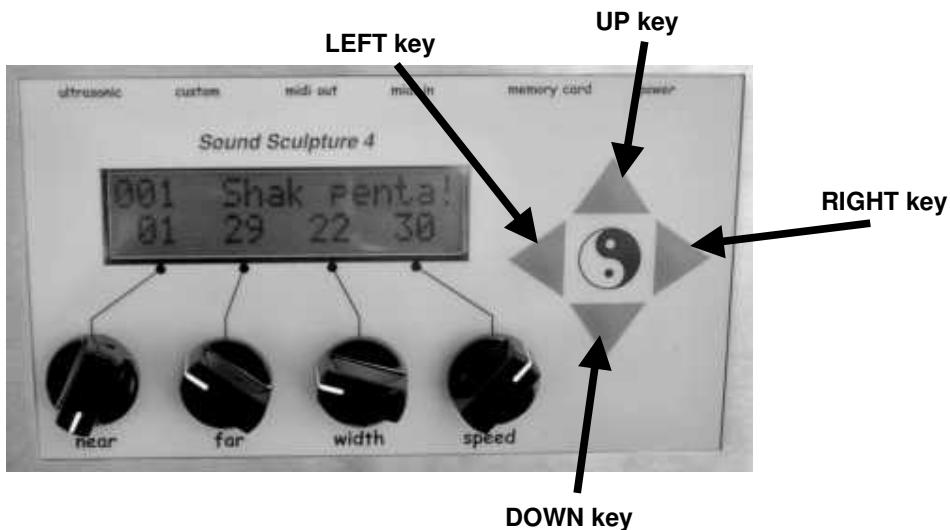


- experiment with the *near, far, width, speed* controls... they're pretty obvious

### Menu System... what is it?

With the menu system you can customise the way you use the Sound Sculpture by choosing a musical scale, selecting a particular sound, etc... there are about forty (40) different things you can change using the menu system.

The menu system is controlled by using the **UP, DOWN, LEFT and RIGHT keys...**



Each item you can change in the menu system is called a **parameter**.

After you have customised the Sound Sculpture to your liking by changing the parameters that interest you, you can **save** any changes you have made so that you can very easily return to your chosen settings.

**Parameters** are saved in groups of 40 called **Sound Patches**. You can save 200 Sound Patches in your Sound Sculpture. Also you can transfer 100 Sound Patches at a time to or from a memory card. When you want to return to a particular sound patch, just find it using the **UP** and **DOWN keys**. Patches are numbered 1 to 200, and you can add a title too. The title can have up to 11 characters.

- to change patches use the **UP** and **DOWN keys**. I've loaded a few patches for you to get going, it's easy to create your own using the menu system.

Try switching between sound patches by using the **UP** and **DOWN keys**...

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- To enter the **menu system** use the **RIGHT key**. You can navigate to a particular **parameter** using the **LEFT** and **RIGHT keys**.

Each **parameter** has a descriptive title at the top left of the screen and an identifying number at the bottom right of the screen. The parameter value itself can be changed using the **UP** and **DOWN keys**. Refer to the parameter listing for more details about each parameter.

You can visualise the **menu system** as a long line of screens. Only one screen is visible at a time.

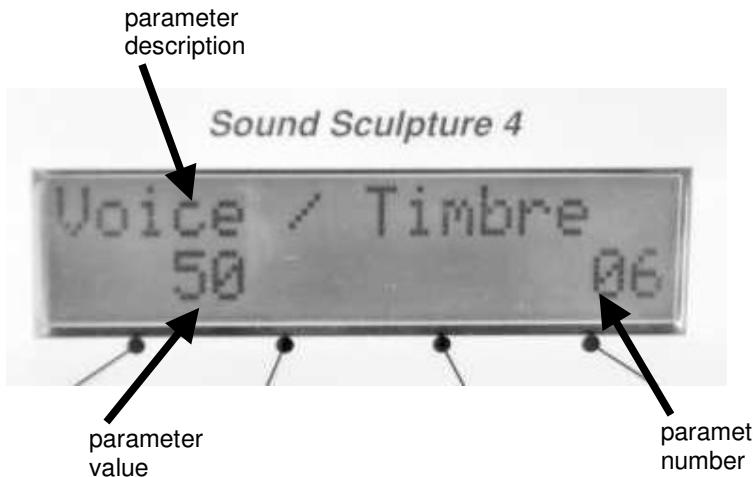
The home screen is at the far left. Just to the right of the home screen is **parameter 1** then further to the right **parameter 2** etc... until at the far right is **parameter 40**.

Using the **LEFT** and **RIGHT keys** is like moving a window along the line until you can see the screen that you want.



Try this example... just to illustrate how the Menu Works... using the **UP**, **DOWN**, **LEFT** and **RIGHT keys**

Using the **LEFT** and **RIGHT keys** find the parameter screen *Parameter 6 'Voice / Timbre'*



Using the **UP** and **DOWN keys** you can change the voice number. This number selects a particular voice or timbre on the synthesiser. If you hold an **UP** or **DOWN key** down for a few seconds the number will start to change more quickly.

You can select whichever sound you like... piano, violin, flute, guitar or whatever using the **UP** and **DOWN keys**. The actual sounds you hear will depend on your particular synthesiser you are using.

The point to notice is that you can select a synthesiser sound by changing the voice number using the **UP** and **DOWN keys**. You will notice the synthesiser sound changes as you do this.

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## Basics

Imagine a piano keyboard in thin air...

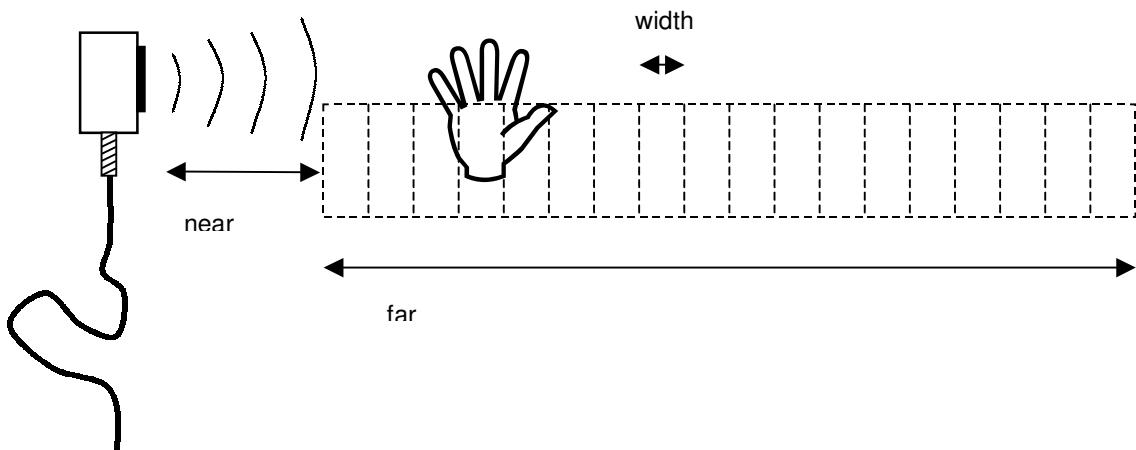
using the **near**, **far** and **width** controls you can choose the size of the imaginary keyboard, and position it within the performance space...

using the **speed** control you can choose the speed or tempo of the music you are making. If you set the **speed** control to minimum, you will be able to control the speed or tempo from an external sequencer, keyboard, metronome or microphone.

the **near** control adjusts the position of the nearest point of the imaginary keyboard.

the **far** control adjusts the length of the imaginary keyboard.

the **width** control adjusts the width of each note on the imaginary keyboard.



The imaginary keyboard can have any number of notes (divisions)... this depends on several factors... and is automatically worked out for you...

note that you can **mute all sounds** by putting your hand closer to the sensor than the **near** distance... try this with a sustained sound like a flute or a voice pad... there is an asterisk next to the near display to let you know if you are interrupting the beam in the **near** space.

You can select a **musical scale** such as Major, Minor, diminished etc using *Parameter 2 'Scale'*

You can **transpose** the musical scale to any key using *Parameter 3 'Transpose'*

You can select the **lowest note** you want to hear using *Parameter 4 " Low Note"*

You can select the **highest note** you want to hear using *Parameter 5 ' High Note'*

You can select the **sound or timbre** you want to hear (piano, flute etc.) using *Parameter 6 ' Voice / Timbre'*. The actual sounds you hear will depend on the particular synthesiser that you are using.

You can select single notes, sustained notes (similar to using the ' Loud' pedal on a piano), or repeated notes using *Parameter 7 'Sustain Type'*

When *Parameter 7 'Sustain Type'* is set to '**Sustain**' , you may like to choose how many notes sound at once using *Parameter 18 'Polyphony'*

Sustained sounds like flutes, voices and organs will continue to sound after you have moved out of the performance space. You can choose how long the notes remain sounding using *Parameter 22 'End Delay'*

You can choose whether the musical scale ascends or descends and whether the scale is played once only, or repeats to fill the performance space, using *Parameter 13 ' Play Mode'*

## Setting the musical parameters

### Choosing a sound...

You can select the **sound or timbre** you want to hear (piano, flute etc.) using *Parameter 6 ' Voice / Timbre'*. The actual sounds you hear will depend on the particular synthesiser that you are using.

### Selecting a scale, setting the highest and lowest notes, transposing...

You can select a **musical scale** such as Major, Minor, diminished etc using *Parameter 2 'Scale'*

You can **transpose** the musical scale to any key using *Parameter 3 'Transpose'*

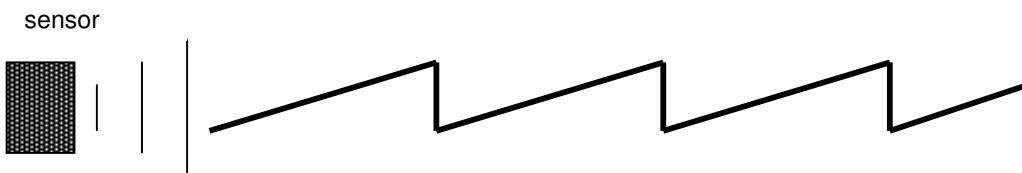
You can select the **lowest note** you want to hear using *Parameter 4 " Low Note"*

You can select the **highest note** you want to hear using *Parameter 5 ' High Note'*

### creating arpeggios...

You can create **arpeggios** and similar musical devices using *Parameter 14 " Autotranspose"* and *Parameters 15, 16, 17 ' Arpeggio X, Y and Z'*

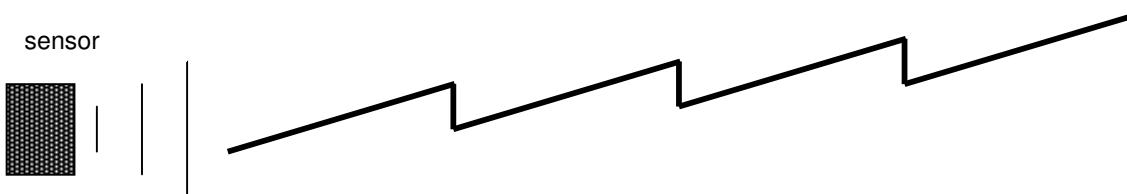
Use *Parameter 14 " Autotranspose"* to automatically transpose the scale up by any interval, each time it is repeated in the performance space... this can create nice harmonic effects when using play mode 2 or 5, in which the scale is repeated to completely fill the performance space. With *Parameter 14 " Autotranspose"* set to 3 for example, the scale will move up by a minor third (3 semitones) as you move through the performance space. Have a look at the pictorial example below...



*Parameter 13 " Play Mode"* set to 2 (repeat the scale to fill the performance space)

*Parameter 14 " Autotranspose"* set to OFF

As you move away from the sensor the scale rises from the lowest note (set by *Parameter 4 " Low Note"*) to the highest note in the scale ( set by *Parameter 5 " HighNote"*). Then the scale starts again from the lowest note and rises to the highest note... etc.



Parameter 13 " **Play Mode**" set to 2 (repeat the scale to fill the performance space)

Parameter 14 " **Autotranspose**" set to 3

As you move away from the sensor the scale rises from the lowest note (set by Parameter 4 " **Low Note**" to the highest note in the scale ( set by Parameter 5 " **High Note**" ) Then the scale starts again, but this time from a point 3 semitones higher... etc.

**Arpeggio X** sets the number of notes in the arpeggio

**Arpeggio Y** sets the interval skip between adjacent notes of the arpeggio.

**Arpeggio Z** sets the jump interval between each arpeggio

For example to create ascending 4 note arpeggios of the tertiary chords (i.e. constructed using intervals of a third) in the harmonised major scale (C Maj7, D min7, E min7, F Maj7, G 7, A min7, B min7 flat 5)...

Choose the major scale (using Parameter 2 '**Scale**)

Select a 4 note arpeggio (set Parameter 15 '**Arpeggio X**' to 4)

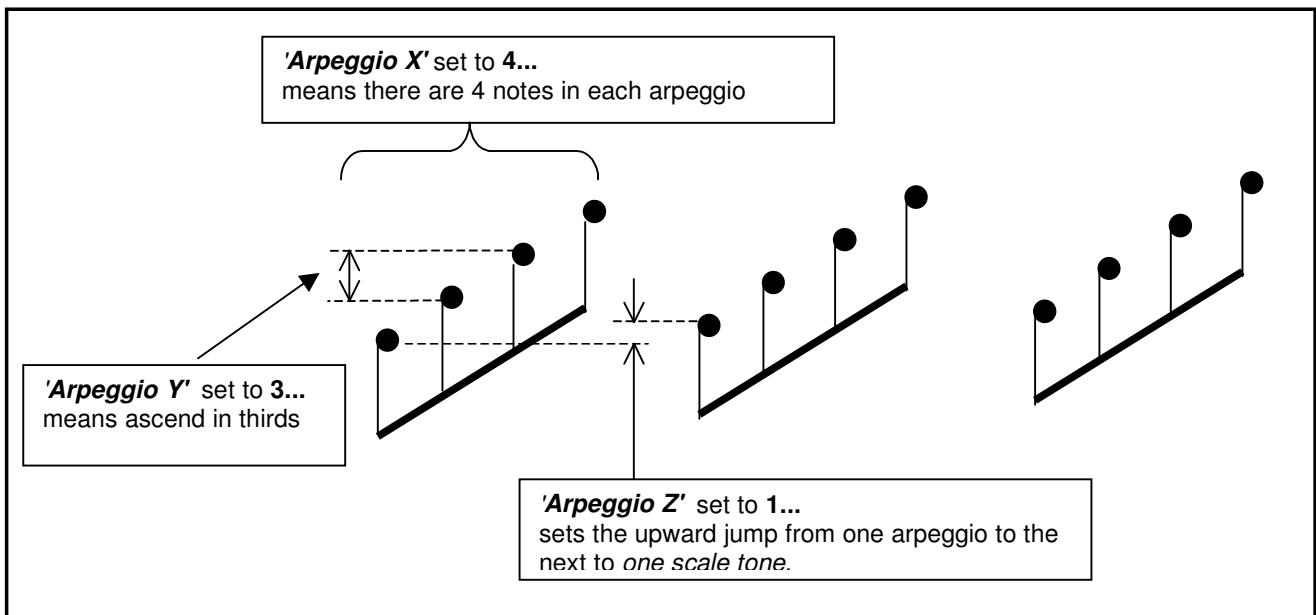
Select interval skip of 3 for tertiary type arpeggio (set Parameter 16 '**Arpeggio Y**' to 3)

Select jump of 1 scale tone (set Parameter 17 '**Arpeggio Z**' to 1)

This will produce the following note sequence from a C major scale...

C-E-G-B D-F-A-C E-G-B-D F-A-C-E G-B-D-F A-C-E-G B-D-F-A etc...

You can transpose this to any key using the transpose parameter. (*Parameter 3 'Transpose'*)



### Recording your own music, scales and chords...

You can record your own scales and chords with a MIDI keyboard plugged into the **midi in** socket using **Parameter 1 'Record'**. Each patch can record up to 192 notes. You can use single notes, chords, or a mixture of notes and chords.

**You will need to save the patch if you want to keep your recording... Your recorded notes are saved with the patch. So you can have up to 200 recordings, with up to 192 notes in each...**

To replay what you have recorded choose the **Recorded Scale** option using **Parameter 2 'Scale'**  
**Note... when you are recording chords, play the chord slowly, or one note at a time, not an arpeggio**  
 though... hold all notes down until the chord is complete. This is because it takes a short but significant time for Sound Sculpture to record each note into its permanent memory.

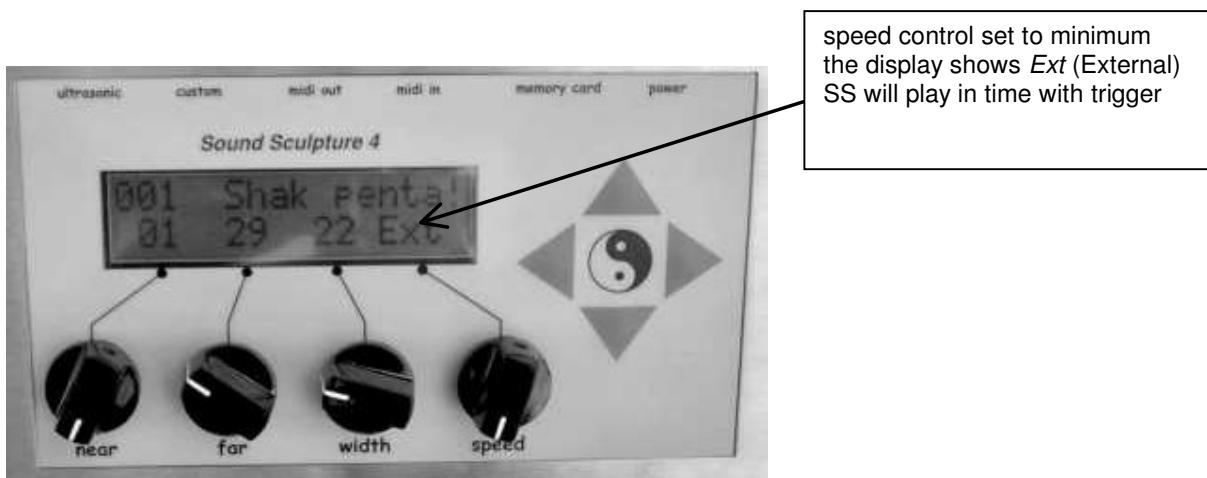
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## Setting the tempo, rhythm and sequencing

There are three ways to set the tempo or rhythm of the music you are playing with Sound Sculpture.

You can use the built in **speed** control. Anticlockwise is faster, clockwise is slower...

If you turn the **speed** control to minimum the display will show ' Ext' meaning that the Sound Sculpture is ready to receive a rhythmic sequence from an external device, which can be a sequencer or a MIDI keyboard plugged into the **midi in** socket, or a metronome, microphone (you may need a pre-amplifier) or something similar that produces a voltage pulse, plugged into the **custom** socket.



When using the **midi in** socket the Sound Sculpture will only produce a note when it is triggered by a **Note On** message corresponding to the note you choose using **Parameter 19 'Ext. Synch Note'**

To try this... connect the **midi out** socket from your keyboard to the **midi in** socket on the Sound Sculpture, set **Parameter 19 'Ext. Synch Note'** to **C3**, turn the **speed** control fully anti-clockwise to ' Ext'

Now tap out a rhythm on the C3 key (middle C) on your keyboard while someone else moves in the performance space. In this case you provide the rhythm while your friend generates the harmony... If you have a sequencer you can write a simple rhythmic motive on middle C (ode to C ?) and use it to trigger the Sound Sculpture automatically while you perform...

To use the **custom** input to trigger the Sound Sculpture, choose the '**Ext Synch**' option for the custom input using *Parameter 36 ' Voltage Input'*

This is particularly useful if you want to use a metronome ( I recommend the Korg MA-30, which has a TAP TEMPO feature as well as some simple rhythms built in), or if you want to play with say a drum kit or bass player (use a microphone and pre-amplifier) or if you want to play along with a CD or other recording...

*Note- the Sound Sculpture doesn' t respond to MIDI time code messages.*

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## Selecting a sensor input

There are two sensor inputs, the **ultrasonic** sensor input and the **custom** (or voltage) sensor input. You can choose to use either one or the other, or both at the same time.

The **ultrasonic sensor input** can be used to play notes, or to send control messages such as pitch bend, modulation, program changes, etc using *Parameter35 ' Ultrasonic Input'*

The **custom (or voltage) sensor input** can be used to play notes, or to send control messages such as pitch bend, modulation, program changes, etc it can also be used to trigger the ultrasonic sensor in time with a metronome, microphone or other pulsed voltage, using *Parameter36 ' Voltage Input'*

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## Using Control Change messages

Choose the control change message you want to send to your synthesiser using *Parameter32 ' Control Message'* . You can choose from **Velocity, modulation or pitch, Program Change**, or select any control change number from 1 to 121

Using *Parameter33 ' Control Low'*and using *Parameter34 ' Control High'*you can select the range of control values you wish to send to the synthesiser.

For example you may want to control **velocity** (equivalent to how hard you hit the keys of a piano) by using a swell pedal (standard synthesiser swell pedals can be used with the **custom** input).

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## Setting the MIDI channels, program changes etc

Choose the MIDI channel to **transmit** note and / or control messages using *Parameter 28 ' TXCh Note / Cont'*

Choose the MIDI channel to **receive** note messages for recording or sequencing using *Parameter 29 ' RXCh Note / Cont'*

Choose the MIDI channel to **transmit Program Change messages** using *Parameter 30 ' TXCh Prog Change'* if you don' t want to transmit program change messages set this to **off**

Choose the MIDI channel to **receive Program Change messages** using *Parameter 31 ' RXCh Prog Change'* if you don't want to receive program change messages set this to **off**

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## Using the custom (voltage) input

The voltage input has an input voltage range from ground (0 Volts) to 5 Volts.

The input connection is via a 5 pin 270 degree DIN socket, pin 1 - ground, pin2 - 5V (current limited by 22R), pin 3 is the 0-5V input. input impedance is 100k.

Most commercial sensors use a voltage range of 0 to 5 Volts, however for increased flexibility, you can select the input voltage range and sensitivity of the voltage input using...

*Parameter 37 ' V Min Volts'* sets the minimum voltage in steps of 0.1 volts

*Parameter 38 ' V Max Volts'* sets the maximum voltage in steps of 0.1 volts

*Parameter 39 ' V Sensitivity'* sets the resolution in steps of 0.1 volts

For example if you have a sensor that produces an output voltage between 1 volt and 4 volts, and you want to divide this 3 volt range into 30 divisions...

set *Parameter 37 ' V Min Volts'* to 10 ( 10 times 0.1 volt = 1 volt)

set *Parameter 38 ' V Max Volts'* to 40 ( 40 times 0.1 volt = 4 volts)

set *Parameter 39 ' V Sensitivity'* to 1 ( 30 times 0.1 volt = 3 volts)

for a standard 0 to 5 volt signal...

set *Parameter 37 ' V Min Volts'* to 1

set *Parameter 38 ' V Max Volts'* to 50

set *Parameter 39 ' V Sensitivity'* to 1

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## Utilities, saving, memory card, title edit, quiet mode

To **save** the changes you have made to a patch...

First give it a suitable title using *Parameter 9 ' Title Edit'*

Then decide where you want to save it (to itself, or to another patch number) using *Parameter 10 ' Save To'*

Then save it using using *Parameter 11 ' Save'*

You can save or load one hundred patches at a time to or from a Sound Sculpture memory card using using *Parameter 8 ' Bulk Data'*

If you are using the Sound Sculpture at close range, up to say 2 metres, then you may wish to reduce the audible clicking of the ultrasonic sensor using *Parameter 21 ' Quiet Mode'* This reduces the power of the ultrasonic sensor.

*Parameter 12 ' Menu Switch'* enables you to choose between the simple menu, which consists of parameters 1 to 12, or the full menu which includes all the more advanced parameters up to parameter number 40.